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ordinary temperature to swell up much more violently than pure water, without however destroying their organization."—Sachs' Text-book of Botany, Bennett & Dyers' Trans., p. 592.

Accompanying the above statement, Sachs gives a figure of the bast-fibers from the leaf of *Hoya carnosa* as they appear after treatment with suphuric acid and iodine. All my attempts to obtain these appearances with "greatly diluted" sulphuric acid having failed, I repeated the experiment using acid (C. P.) of known strength. No perceptible effect was produced by the application to different specimens ofdilutions containing 20, 30, 40 or 50 per cent. of acid. Sixty per cent. acid however produced the extraordinary swelling as figured by Sachs. Similar experiments were tried with the bast-fibers from the leaves of *Yucca aloifolia* and *Latonia Borbonica* with similar results. It seems to me that 60 p. c. acid can hardly be said to be "greatly diluted."

Can any one explain the discrepancy?—LIZZIE SHOEMAKER, *Botanical Laboratory, Purdue University, LaFayette, Ind.*

A Bit of Fern History.—In reviewing the history of some of our rare ferns during the past ten years, it is interesting to note the changes which have occurred in their comparative scarcity and abundance.

Ten years ago *Botrychium simplex* was so great a rarity that one might almost despair of ever obtaining a specimen; now it is plentiful enough, obtainable with little or no difficulty, and seldom called for in exchange. In Massachusetts it had not been collected for many years, when E. S. Wheeler detected it in Berlin, in 1878. Since then it has only been recorded twice—both times from Essex Co.—and is still rare in the State where it was originally discovered by Rev. Edward Hitchcock, in 1822. When E. S. Miller found it on Long Island, N. Y., in 1873, those who were able to secure specimens from him, regarded themselves as fortunate indeed. But in 1877 Mrs. Chas. Barnes, of Syracuse, found it so plentiful in the North Woods that she was able to supply many demands for it, while in the same year Mr. Pringle found it equally plentiful in Vermont. Since then it has continued to turn up at intervals in different localities from Maine to California, until probably no one who has made any effort to make up a collection of North American Ferns is without a specimen.

The writer recalls the pleasurable emotions with which he first received imperfect specimens of *Asplenium myriophyllum* and *Cheilanthes Lindheimeri*, at that time desiderata so rare as seemingly to be placed beyond reach. The first of these was received from Dr. Chapman himself—the specimen being the last of the original collection made by him twenty years before, a fact which enhanced its value greatly—and the writer still remembers how eagerly some friends received, and how much they prized the precious bits which he ventured to detach from his specimen to share with them. But since its re-discovery by Mr. Shockley in 1878, the collections of J. Donnell Smith, Miss Reynolds and A. H. Curtiss have left no excuse for anyone's being without a specimen.

Cheilanthes Lindheimeri has also been placed within the reach of all through the recent collections of H. H. Rusby, C. G. Pringle and others, who have found it plentiful in New Mexico and Arizona —it being especially abundant along the foot-hills in the mountain ranges of the south-eastern portion of the last named territory.

In making up a list of ferns considered rare, or difficult to obtain when the writer began his herbarium in 1873, the following may be given:

1. Acrostichum aureum.
2. Polypodium Plumula.
3. falcatum.
4. Scouleri.
5. Phyllitis.
6. Gymnogramme hispida. (Then the *G. pedata* of our check lists.)
7. Notholæna sinuata.
8 ferruginea.
9 candida.
10 dealbata.
11 Newberryi.
12 Hookeri. (Then *N. cretacea*).
13 Fendleri.
14. Cheilanthes Californica.
15. Wrightii
16. microphylla.
17. Alabamensis.
18. tomentosa.
19 Eatoni.
20. myriophylla.?
21. Lindheimeri.
22. argentea. (Doubtfully admitted).
23 Cryptogramme acrostichoides.
24. Pellœa Breweri.
25. Bridgesii.
26. aspera.(Then *Cheilanthes aspera*).
27. ternifolia.
28. Wrightii.
29. flexuosa.
30. pulchella.
31. densa.
32. Pteris longifolia.
33. Cretica.
34. Adiantum tricholepis. (The *A. pilosum* of that date).
35. Blechnum serrulatum.
36. Lomaria spicant.
37. Asplenium pinnatifidum.
38. ebenoides.
39. parvulum.
40. viride.
41. dentatum.
42. Bradleyi.
43. septentrionale.
44. myriophyllum.
45. Phegopteris alpestris.
46. Aspidium Lonchitis.
47. fragrans.
48. juglandifolium.
49. Cystopteris montana.
50. Woodsia hyperborea.
51. glabella
52. scopulina.
53. Oregana.
54. Nephrolepis exaltata.
55. Trichomanes Petersii.
56. Schizœa pusilla.
57. Aneimia Mexicana.
58. adiantifolia.
59. Botrychium simplex.
60. Lunaria.
61. boreale.
62. Ophioglossum nudicaule.
63. crotalophoroides. (Then *O. bulbosum*).

During the succeeding five years very little or no decided change took place in the status of any of these species, while at the close of that period the list might have been increased by the addition of the following:

64. Polypodium pectinatum.
65. Notholæna Parryi.
66. tenera.
67. Cheilanthes leucopoda.
68. Clevelandii.
69. Cooperæ.
70. Pteris serrulata.
71. Adiantum tenerum.
72. Asplenium firmum.
73. cicutarium.
74. Aspidium unitum.
75. Ophioglossum palmatum.

Here we have 75 species which might have been considered rare at the beginning of 1878, more than one half of the whole number of species then known. It will be observed, however, that the greater number of these species were southern—mostly in the gulf-states—and south-western, extending through the territories into California, with only an occasional species in the north, and one might have inferred from this that, for most part, they were rare only because of the partial explorations in those regions.

Subsequently a marked change began. The growing interest in fern pursuits, stimulated by the inspiriting work on our North American Ferns by Prof. Eaton—to whom we are all under such deep obligations, and who is justly to be regarded as the founder of systematic American Pteridology—led to many nearly simultaneous efforts on the part of numerous collectors which resulted in making a large percentage of our rare ferns common, others more readily obtainable, and adding other species to our national flora.

In 1877–78 the lamented Dr. Garber was in Florida, making finer specimens of Florida ferns than had been seen before, and bringing to light many hidden treasures. The re-discovery of *Asplenium dentatum*, *Pteris longifolia*, and the discovery of *Asplenium serratum* and *Ceratopteris thalictroides* in that state will always be associated with his ever to be remembered name.

The veteran Chapman, who in his old age seemed to have quaffed an invigorating draught from that "Fountain," for which Ponce de Leon sought so long in vain, not to be outdone, had signaled the renewal of his activity, and shed new lustre on his honored name by the fine discovery of *Ophioglossum palmatum* in 1875; and now, the discovery of *Asplenium cicutarium* by Capt. C. F. Adams, the re-discovery of *Asplenium myriophyllum* and *Pteris Cretica* by Mr. Shockley, was followed by the fine collections of J. Donnell Smith, and his splendid discovery of *Aspidium conterminum*.

Latterly that indefatigable botanical collector, A. H. Curtiss, has been vigorously pushing his explorations of the southern coast region of Florida out on to the Florida Keys with excellent results, supplying prominent herbaria with his fine complete specimens and adding *Cheilanthes microphylla*, *Aspidium trifoliatum*, *Tænitis lanceolata* and *Polypodium Swartzii* to the flora of that state—the two, and at the time of collection, the three last of these being new to the United States as well.

The discovery of *Asplenium viride*, *Woodsia hyperborea* and *Botrychium simplex* in Vermont by C. G. Pringle; of *Botrychium Lunaria* in Connecticut by Oscar Harger and Dr. F. W. Hall; of *Asplenium ebenoides* in the same state by J. S. Adam, and in New York state by Clarence Lown; the unexpected discovery of *Scolopendrium vulgare* in Tennessee by Mr. Cheathem, as recorded by John Williamson; the re-discovery of *Botrychium boreale*—doubly interesting as a verification of Milde's recorded station for it—,with the original discovery of *Aspidium Oreopteris* in Unalaska by L. M. Turner; of *Aspidium Mohrioides* in California by J. G. Lemmon; of *Cystopteris montana*, *Aspidium Lonchitis* and *Botrychium Lunaria* in Colorado by T. S. Brandegee; of *Notholœna Grayi* in Arizona by W. M. Courtis; of *Notholœna Lemmoni* and *N. nivea* in the same territory by Lemmon; *Cheilanthes Parishii* in California by the Parish Bros.; the re-discovery of *Pellœa aspera* in Texas by Dr. Edward Palmer, with many other interesting discoveries which have been recorded from time to time, marked this period, while recent collectors have so changed the status of the southern and southwestern ferns that our previous lists may now be reduced to the following, which will be interesting for comparisons five or ten years hence:

1. Notholæna ferruginea.
2. tenera.
3. Cheilanthes leucopoda.
4. microphylla.
5. myriophylla. ? (As understood by the writer)
6. argentea. (Its actual presence yet to be verified).
7. Pellœa Breweri.
8. Bridgesii.
9. aspera.
10. pulchella.
11. ternifolia.
12. flexuosa.
13. Pteris serrulata.
14. longifolia.
15. Adiantum tricholepis.
16. Asplenium ebenoides,
17. dentatum.
18. Bradleyi.
19. septentrionale.
20. cicutarium.
21. Phegopteris alpestris.
22. Aspidium Lonchitis.
23. fragrans.
24. juglandifolium.
25. Cystopteris montana.
26. Woodsia hyperborea.
27. glabella.
28. Trichomanes Petersii.
29. Schizœa pusilla.
30. Aneimia Mexicana.
31. adiantifolia.
32. Botrychium boreale.
33. Ophioglossum nudicaule.
34. crotalophoroides.
35. palmatum.

Here we have a reduction of more than one half from the list as given before, but to these may be added the more recent discoveries of

36. Polypodium Swartzii.
37. Notholæna nivea.
38. Grayi—plentiful enough in Arizona, but not fairly in distribution.
39. Lemmoni— " " " " " " " " "
40. Cheilanthes Parishii.
41. Asplenium serratum.
42. Tænitis lanceolata.
43. Aspidium trifoliatum.
44. Oreopteris.
45. conterminum.
46. Woodsia Mexicana.
47. Ceratopteris thalictroides.

making a total number of 47 species which may be regarded as rare ferns or which are not easily obtained at the present time. The experience already recorded, however, justifies the belief that many of these will be found plentiful enough when the regions where they grow are more thoroughly explored, while the increasing railroad facilities and communications are opening to the botanist vast regions before almost inaccessible and holding out promises of many further additions to our fern flora.

There are, however, seemingly a few ferns that remain rare, even in well explored regions, and others so local, that, although they may be obtained without much difficulty, they must still be regarded as rare ferns on account of their restricted local distribution. Of the former class *Asplenium ebenoides* may be cited as an example, and of the latter *Schizœa pusilla*, which is wholly restricted as far as now known to a very limited area in New Jersey and the single station recently discovered in Nova Scotia by Miss, Knight. No where else has this little fern been found, and although it is apparently quite plentiful, its limited area should teach moderation in collecting it, lest in time it become wholly eradicated and lost.—GEO. E. DAVENPORT, *Medford, Mass.*

SUB.-NOTE.—An instance of the unexpected manner in which rare ferns occasionally turn up occurs in the recent discovery or rediscovery ot *Ophioglossum nudicaule* in San Diego, California, by Dr. C. C. Parry.

Dr. Parry found this fern in San Diego as long ago as 1850, while connected with the Mexican Boundary Survey, but it was not identified at that time, and losing his specimens while crossing the Isthmus he has never been able to verify his discovery until now. I have received specimens from Dr. Parry and also from Daniel Cleveland, Esq., who was with him at the time of his interesting re-discovery of the plant in March last.—G. E. D.

Pholisma arenarium, Nutt.—The statement is made in the Botany of California (vol. I. p. 464) that this plant grows in "sandy soil and at the base of hills, near Monterey and San Diego, Douglas, Nuttall, &c. Parasitic on the roots of oaks?"

I have been unable to learn that any specimens of this plant were collected by any one but Nuttall, and at San Diego, in 1835–6, until it was re-collected by me in 1875. The fruit is known only from my specimens. This plant is parasitic on the roots of *Eriodyction tomentosum*, and not upon the roots ot Oaks. It grows in sandy spots, in groups of from twenty-five to fifty, or more.—D. CLEVELAND, *San Diego, California.*

Jasminum odoratissimum.—One of my college students, Mr. E. W. Shedd, of the Sophomore class of Brown University, was at work the other day in describing by schedule a branch of *Jasminum odoratissimum*. He called my attention to a peculiarity of the corolla. It will be remembered that this is salverform, with five spreading lobes. In the plant under examination, which is before me as I write, two of the lobes of all the flowers differ from the rest in their calceolate form. These two lobes are the opposed ones, though there is an evident tendency in all to become slipper-form. I do not observe any accompanying alteration ot the essential organs. I find the college students very quick to observe any deviations from a normal condition.—W. W. BAILEY, *Brown University.*